

AMENDMENTS TO THE CLAIMS

Please enter the following amendments:

1. (Currently Amended) A brain current source estimating method for estimating, based on an electromagnetic field observed outside a scalp, a position of a current source as a source of said electromagnetic wave field existing in the brain, comprising the steps of

setting, in the brain, a plurality of virtual computer simulated curved surfaces having depths from brain surface different from each other and shapes not intersecting with each other, and setting lattice points on each of said virtual computer simulated curved surfaces;

automatically estimating, on each of said virtual computer simulated curved surfaces, a current distribution for recovering said observed electromagnetic field; and

based on an expansion of the current distribution estimated on each one of said virtual computer simulated curved surfaces and a difference between the an electromagnetic field recovered based on said current distribution and said observed electromagnetic field, identifying a virtual computer simulated curved surface at which said expansion and said difference attain relative minimums among said plurality of virtual computer simulated curved surfaces as a true curved surface on which said current source exists.

2. (Currently Amended) The brain current source estimating method according to claim 1, wherein

said step of automatically estimating said current distribution includes the step of determining posterior probability by Bayesian estimation method from prior distribution and observation data of said electromagnetic field; and

said step of identifying as a true curved surface on which said current source exists includes the step of

identifying a ~~virtual computer simulated~~ curved surface of which corresponding said posterior probability attains the maximum, among said ~~virtual computer simulated~~ curved surfaces.

3. (Currently Amended) The brain current source estimating method according to claim 2, wherein

said step of automatically estimating a current distribution includes the step of

identifying a first ~~virtual computer simulated~~ curved surface closest to said brain surface and having posterior probability attaining a relative maximum, among said plurality of ~~virtual computer simulated~~ surfaces, while successively moving from a ~~virtual computer simulated~~ curved surface on the side of the brain surface to a deeper side; and

said step of identifying a curved surface as a true curved surface on which said current source exists includes the steps of

identifying a localized current distribution corresponding to a point of relative maximum of said current distribution, on said first ~~virtual computer simulated~~ curved surface,

separating a plurality of local surfaces each including said localized current distribution, and

fixing, among said plurality of local surfaces, local surfaces other than a local surface as an object of identification, moving said local surface as an object of identification in the depth direction, and identifying positions where said posterior probability attains the relative maximum, successively from the side closer to said brain surface.

4. (Currently Amended) The brain current source estimating method according to claim 3, wherein

in said step of automatically estimating a current distribution, said current distribution is estimated with a first spatial resolution;

said method further comprising the step of

re-estimating said current distribution with a second spatial resolution higher than said first resolution and resolution of said plurality of virtual computer simulated curved surfaces in the depth direction being improved.

5. (Currently Amended) The brain current source estimating method according to claim 1, wherein

said step of automatically estimating a current distribution includes the step of

setting, when said current distribution is estimated in accordance with Bayesian estimation, a hierarchical prior distribution in said Bayesian estimation using observation data obtained by other observation method independent of said observation of electromagnetic field for said estimation of the current source.

6 – 10. (Canceled)

11. (Currently Amended) A brain current source estimating apparatus for estimating, based on an electromagnetic field observed outside a scalp, a position of a current source as a source of said electromagnetic ~~wave~~ field existing in the brain, comprising:

~~virtual~~ computer simulated curved surface setting means for setting, in the brain, a plurality of ~~virtual~~ computer simulated curved surfaces having depths from brain surface different from each other and shapes not intersecting with each other, and setting lattice points on each of said ~~virtual~~ computer simulated curved surfaces;

current distribution estimating means for automatically estimating, on each of said ~~virtual~~ computer simulated curved surfaces, a current distribution for recovering said observed electromagnetic field; and

current source identifying means for identifying, based on an expansion of the current distribution estimated on each one of said ~~virtual~~ computer simulated curved surfaces and a difference between the an electromagnetic field recovered based on said current distribution and said observed electromagnetic field, a ~~virtual~~ computer simulated curved surface at which said expansion and said difference attain relative minimums among said plurality of ~~virtual~~ computer simulated curved surfaces as a true curved surface on which said current source exists.

12. (Currently Amended) The brain current source estimating apparatus according to claim 11, wherein

said automatic current distribution estimating means includes

posterior probability determining means for determining posterior probability by Bayesian estimation method from prior distribution and observation data of said electromagnetic field; and

said current source identifying means includes

~~virtual computer simulated~~ curved surface identifying means for identifying a ~~virtual computer simulated~~ curved surface of which corresponding said posterior probability attains the maximum, among said ~~virtual computer simulated~~ curved surfaces.

13. (Currently Amended) The brain current source estimating apparatus according to claim 12, wherein

said automatic current distribution estimating means includes

shallowest ~~virtual computer simulated~~ curved surface identifying means for identifying a first ~~virtual computer simulated~~ curved surface closest to said brain surface and having posterior probability attaining a relative maximum, among said plurality of ~~virtual computer simulated~~ surfaces, while successively moving from a ~~virtual computer simulated~~ curved surface on the side of the brain surface to a deeper side; and

said current source identifying means includes

localized current distribution identifying means for identifying a localized current distribution corresponding to a point of relative maximum of said current distribution, on said first ~~virtual computer simulated~~ curved surface,

local surface extracting means for separating a plurality of local surfaces each including said localized current distribution, and

local surface position identifying means for fixing, among said plurality of local surfaces, local surfaces other than a local surface serving as an object of identification, moving said local surface as an object of identification in the depth direction, and identifying positions

where said posterior probability attains the relative maximum, successively from the side closer to said brain surface.

14. (Currently Amended) The brain current source estimating apparatus according to claim 13, wherein

said automatic current distribution estimating means estimates said current distribution with a first spatial resolution and thereafter re-estimates said current distribution with a second spatial resolution higher than said first resolution and resolution of said plurality of ~~virtual~~ computer simulated curved surfaces in the depth direction being improved.

15. (Currently Amended) The brain current source estimating apparatus according to claim 11, wherein

said automatic current distribution estimating means includes means for setting, when said current distribution is estimated in accordance with Bayesian estimation, a hierarchical prior distribution in said Bayesian estimation using observation data obtained by other observation method independent of said observation of electromagnetic field for said estimation of the current source.

16. (Currently Amended) A ~~recording~~ computer readable medium ~~recording a computer storing program code for estimating causing a computer to estimate~~, based on an electromagnetic field observed outside a scalp, a position of a current source as a source of said electromagnetic wave field existing in the brain, ~~said the program code causing the computer to perform a method~~ comprising the steps of:

setting, in the brain, a plurality of ~~virtual~~ computer simulated curved surfaces having depths from brain surface different from each other and shapes not intersecting with each other, and setting lattice points on each of said ~~virtual~~ computer simulated curved surfaces;

automatically estimating, on each of said ~~virtual~~ computer simulated curved surfaces, a current distribution for recovering said observed electromagnetic field; and

based on an expansion of the current distribution estimated on each one of said ~~virtual~~ computer simulated curved surfaces and a difference between the an electromagnetic field recovered based on said current distribution and said observed electromagnetic field, identifying a ~~virtual~~ computer simulated curved surface at which said expansion and said difference attain relative minimums among said plurality of ~~virtual~~ computer simulated curved surfaces as a true curved surface on which said current source exists.

17. (Currently Amended) The ~~recording~~ computer readable medium according to claim 16, wherein

said step of automatically estimating said current distribution includes the step of determining posterior probability by Bayesian estimation method from prior distribution and observation data of said electromagnetic field; and

said step of identifying as a true curved surface on which said current source exists includes the step of

identifying a ~~virtual~~ computer simulated curved surface of which corresponding said posterior probability attains the maximum, among said ~~virtual~~ computer simulated curved surfaces.

17. (Currently Amended) The ~~recording~~ computer readable medium according to claim 17, wherein

said step of automatically estimating a current distribution includes the step of identifying a first ~~virtual~~ computer simulated curved surface closest to said brain surface and having posterior probability attaining a relative maximum, among said plurality of ~~virtual~~ computer simulated surfaces, while successively moving from a ~~virtual~~ computer simulated curved surface on the side of the brain surface to a deeper side; and

said step of identifying a curved surface as a true curved surface on which said current source exists includes the steps of

identifying a localized current distribution corresponding to a point of relative maximum of said current distribution, on said first ~~virtual~~ computer simulated curved surface,

separating a plurality of local surfaces each including said localized current distribution, and

fixing, among said plurality of local surfaces, local surfaces other than a local surface serving as an object of identification, moving said local surface as an object of identification in the depth direction, and identifying positions where said posterior probability attains the relative maximum, successively from the side closer to said brain surface.

18. (Currently Amended) The ~~recording~~ computer readable medium according to claim 18, wherein

in said step of automatically estimating a current distribution, said current distribution is estimated with a first spatial resolution;

said method further comprising the step of

re-estimating said current distribution with a second spatial resolution higher than said first resolution and resolution of said plurality of ~~virtual~~ computer simulated curved surfaces in the depth direction being improved.

20. (Currently Amended) The ~~recording~~ computer readable medium according to claim 16, wherein

said step of automatically estimating a current distribution includes the step of setting, when said current distribution is estimated in accordance with Bayesian estimation, a hierarchical prior distribution in said Bayesian estimation using observation data obtained by other observation method independent of said observation of electromagnetic field for said estimation of the current source.